

APPLICATION FOR UNITED STATES LETTERS PATENT

INVENTOR(S): Ken IGARASHI

INVENTION: METHOD AND APPARATUS FOR HANDLING  
SERVICES BY A PROXY

S P E C I F I C A T I O N

This application is based on Patent Application No. 2000-395399 filed December 26, 2000 in Japan, the content of which is incorporated hereinto by reference.

5

## BACKGROUND OF THE INVENTION

### FIELD OF THE INVENTION

The present invention relates to a method and  
10 apparatus for handling services by a proxy, and more specifically, to a method and apparatus for handling services by a proxy, in which a service that cannot be completed by a user is executed by an agent on behalf of the user and in which the user is notified of the results  
15 of the completion.

### DESCRIPTION OF THE RELATED ART

Downloading of information required by a user, from  
20 a WWW (World Wide Web) server, is known as a method for distributing information over the Internet. If the user has a plurality of computers and has constructed a LAN (Local Area Network), a proxy server is generally used to connect the LAN to the Internet. The proxy server has  
25 various functions such as the one of limiting packets flowing from the Internet into the LAN, on the basis of predetermined security packets.

Further, the proxy server has a cache function represented by a httpd (hyper text transfer protocol daemon). With the cache function, packets passing through the proxy server are sequentially accumulated, and if data requested by the user has been accumulated in the proxy server, the proxy server sends the data back to the user. To download information from the WWW server, the cache function enables the reduction of traffic to the WWW server, which actually transmits data.

However, the cache function does not accumulate data on behalf of the user during a service interruption unintended by the user, that is, a service interruption due to downloading. Thus, disadvantageously, information is not ensured to be transferred during a service interruption.

The user has no methods for dealing with a service interruption caused by a failure in the WWW server or the disconnection of the line. Another problem is that the user does not know when the service will be resumed.

#### SUMMARY OF THE INVENTION

It is an object of the present invention to provide a proxy service control method and apparatus which prevents a service interruption unintended by the user, by allowing an agent to execute the service on behalf of the user.

To attain this object, the present invention provides

a proxy service control method for executing, on behalf of an application stored in a user's terminal, a service being provided on a session set between the application and a server, the method being characterized by comprising:

5 a storage step of storing session information on the session in response to the user's request; a monitor step of monitoring whether or not the session is being continued between the application and the server; a proxy step of continuing the session with the server on behalf of the

10 application on the basis of the session information stored in the storage step, if it is determined in the monitor step that the session has been interrupted; and a transfer step of transferring the service on the session received in the proxy step, to the application.

15 According to this method, if a service interruption unintended by the user occurs, the service can be completed on behalf of the user by reproducing the session on the basis of the stored session information.

The proxy service control method further comprises

20 a detection step of detecting an ability of the application to receive the service and a conversion step of converting the service on the session received in the proxy step, into a different reception form on the basis of the ability detected in the detection step, and in that the transfer

25 step transfers the service in the reception form converted in the conversion step.

According to this method, the service receiving

method is converted depending on the ability of the user's terminal to receive services, thereby ensuring that information is transferred.

The above and other objects, effects, features and  
5 advantages of the present invention will become more apparent from the following description of embodiments thereof taken in conjunction with the accompanying drawings.

#### 10 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a functional block diagram illustrating a proxy service control method according to an embodiment of the present invention;

15 Fig. 2 is a flow chart showing the proxy service control method according to the embodiment of the present invention; and

Fig. 3 is a flow chart showing a media converting method in the proxy service control method according to  
20 the embodiment of the present invention.

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

An embodiment of the present invention will be  
25 described below in detail with reference to the drawings.

Fig. 1 shows a functional block diagram of a proxy service control method according to the embodiment of the

present invention. A user's terminal 101 that receives services and a WWW server 102 that provides services are connected together via a network 103. The network 103 has a software module composed of a service agent (hereinafter referred to as an "SA") 111 that executes the proxy service control method according to the present invention and a mail transfer agent (hereinafter referred to as a "MTA") 113 that controls the transfer of mails. In this regard, the SA 111 may be constructed as a proxy service control apparatus according to the present invention or as a general-purpose computer that executes the proxy service control method.

The terminal 101 has an application 114 that serves to receive services and a mail user agent (hereinafter referred to as a "MUA") 112 that controls the transmission and reception of mails. This embodiment will be described in conjunction with the case where the application 114 acts as an agent that executes a service on behalf of a user and the case where the MUA 112 acts as the same agent, but the agent may be either of them or another application such as a browser, for example.

The SA 111 has a session storage section 121 connected to the WWW server 102, application 114, and MUA 112 to store sessions and corresponding to storage means, a result notifying section 122 connected to a proxy request section 123, the application 114, and the MUA 112, the proxy request section 123 being connected to the WWW server 102 to make

request for proxy control and corresponding to proxy means,  
a proxy reception section 125 connected to the WWW server  
102 to obtain information on behalf of a user and  
corresponding to monitor means, and a media converting  
5 section 124 connected to the MTA 113 and corresponding to  
transfer means.

With this construction, the session storage section  
121 of the SA 111 stores a session on behalf of a user if  
the user makes a corresponding request. If a fault occurs  
10 in the WWW server 102 to stop its services and the transfer  
of information is interrupted, the proxy request section  
123 transmits the user's request to the WWW server on behalf  
of the user. The proxy request section 123 reproduces the  
session stored in the session storage section 121. Upon  
15 receiving the acceptance of the service request from the  
WWW server 102, the result notifying section 122 determines  
whether or not the user can continue to receive the service,  
and if so, notifies the application 114 of the result.

The proxy reception section 125 monitors the  
20 connection of the session stored in the session storage  
section 121. For example, if information is being  
distributed to the user according to the HTTP (Hyper Text  
Transfer Protocol) and the line is disconnected before the  
user receives an HTTP response, the proxy reception section  
25 125 receives the information on behalf of the user. If  
the media converting section 124 checks the abilities of  
the user's MUA 112 to determine that the MUA 112 can receive

the information by itself, the media converting section 124 converts the received information into an electronic mail form and transmits it to the MTA 113. If the MUA 112 cannot receive the information, the media converting  
5 section 124 converts the information into an electronic mail form corresponding to the abilities of the MUA 112 and then transmits the converted information to the MTA 113.

Fig. 2 shows the proxy service control method  
10 according to the embodiment of the present invention. The session between the user's terminal 101 and the WWW server 102 is stored in the session storage section 121 (S201). For example, if the HTTP is being used, the session storage section 121 stores HTTP requests such as GET and POST which  
15 are transmitted from the user's terminal 101 to the WWW server 102 and HTTP responses returned from the WWW server 102 to the user's terminal 101.

For the stored session, the session storage section 121 monitors whether or not appropriate results for the  
20 user's request are being returned by the WWW server 102 (S202). If appropriate results are not being returned, the proxy request section 123 transmits the user's request to the WWW server 102 on behalf of the user (S203). The session storage section continues to monitor whether or  
25 not appropriate results for the user's request are being returned, and if not, repeats transmitting the user's request to the WWW server on behalf of the user (S204).



Upon receiving the acceptance of the user's request from the WWW server 102, the result notifying section 122 determines whether or not the user can continue to receive the service (S205). If the user can continue to receive the service, the result notifying section 122 notifies the application 114 of the result (S206), and transmits the received information directly to the user to complete the process. If the user cannot receive the service, the procedure shifts to a process of transmitting information after a media conversion, described later in Fig. 3.

Fig. 3 shows a media converting method in the proxy service control method according to the embodiment of the present invention. The proxy reception section 125 receives a response to the user's request which has been transmitted by the WWW server 102 (S301). For example, if the user is receiving distributed information according to the HTTP and if the line is disconnected while the user is receiving an HTTP response, the proxy reception section 125 determines that a service interruption unintended by the user occurs, to receive the information on behalf of the user.

The media converting section 124 checks the abilities of the user's MUA 112 to determine whether or not the MUA 112 can receive the information by itself (S302). If the MUA 112 can receive the information by itself, the media converting section 124 converts the received information into an electronic mail form and transmits it to the MTA

113 (S303). If the MUA 112 cannot receive the information,  
the media converting section 124 converts the information  
into an electronic mail form corresponding to the abilities  
of the MUA 112 and then transmits the converted information  
5 to the MTA 113 (S304).

For example, an explanation will be given of the case  
where the user is receiving an information providing  
service from the WWW server using a document in the HTML  
(Hyper Text Markup Language) form. If the media  
10 converting section 124 determines that the user's MUA 112  
can receive only documents of a text form, one of the  
electronic mail forms, then it converts the document in  
the HTML form into one in the text form. Specifically,  
absolute paths of HTML document links are displayed in the  
15 text form, and HTML input tags are converted into symbols  
such as ( ).

According to this embodiment, if a service  
interruption unintended by the user occurs, the service  
can be completed on behalf of the user by reproducing the  
20 corresponding session on the basis of the stored session  
information.

Further, if the user is billed on the basis of the  
time for which the user has been connected to the Internet,  
unwanted billing is prevented because this embodiment  
25 allows the interrupted service to be completed on behalf  
of the user.

Furthermore, in a mobile communication system, a

radio line is disconnected when it is to be switched to another. According to this embodiment, the user can receive the results of the service immediately after the line has been recovered.

5           The present invention has been described in detail with respect to preferred embodiments, and it will now be apparent from the foregoing to those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspects, and  
10 it is the intention, therefore, in the appended claims to cover all such changes and modifications as fall within the true spirit of the invention.